

WHAT IS CLAIMED IS:

1. A method of laying a tire belt ply on a generally cylindrical form; the ply comprising a front area, a rear area, and an intermediate area; the front and rear areas being bordered by respective front and rear edges, each of the front and rear areas being formed by at least three gripping sectors including a toe and a heel, wherein the alignment of the front and rear edges is effected by moving independently at least one gripping sector of each of the front and rear areas by a variable correction value determined by a method which comprises:

passing the front and rear edges across a fixed detection line for measuring the angular geometries of the front and rear edges and determining a correction value; and

independently moving at least one gripping sector of each of the front and rear edges by the correction value.

2. Method according to Claim 1, wherein the correction value is determined according to a difference between the angular geometries of the front and rear edges.

3. Method according to Claim 1, wherein the correction value is determined according to a difference between the angular geometries measured for each of the front and rear edges and a predetermined reference angular value.

4. Method according to Claim 1, in which the gripping sectors of the front and rear areas are gripped by a corresponding number of gripping assemblies disposed on a respective front and rear movable transporters, and in which at least one gripping assembly is equipped with a ply edge corrector for independently moving the corresponding gripping sector.

5. Method according to Claim 4, using a front transporter and a rear transporter, and further comprising the following steps:

unwinding onto a conveyer a continuous strip of belt from a feed system,

5 cutting the belt strip along a line parallel to ply cords of the belt, so as to leave the front edge clear, gripping the front area by means of the gripping assemblies situated on the front transporter,

unwinding a predetermined length (L1) of belt strip,

determining the angular geometry of the front edge upon passing across the fixed detection line,

10 gripping the rear area by means of the gripping assemblies situated on the rear transporter,

cutting the strip of belt along a line parallel to the ply cords so as to leave clear the rear edge and obtain a belt ply,

advancing the belt ply,

15 determining the angular geometry of the rear edge upon passing across the detection line,

aligning the front edge and the rear edge,

bringing the laying form closer,

depositing the front area on the laying form,

winding the intermediate area around the laying form, and

depositing the rear area on the laying form.

5 6. Method according to Claim 4, using a single transporter, and further comprising the following steps:

unwinding a continuous belt strip, on a conveyer from a feed system,

cutting the belt strip along a line parallel to the ply cords, so as to leave the front edge clear,

10 gripping the front area, by means of the gripping assemblies situated on the transporter,

unwinding the belt strip,

determining the angular geometry of the front edge upon passing across a fixed detection line,

aligning the front edge,

15 bringing the laying form closer,

depositing the front area on the laying form,

continuing the unwinding of the belt strip until a predetermined ply length is obtained, while continuing to wind up the intermediate area around the laying form,

gripping the rear area by means of the gripping assemblies situated on the transporter,

cutting the belt strip along a line parallel to the ply threads so as to leave clear the rear edge and obtain a belt ply,

5 advancing the belt ply while continuing to wind up the intermediate area around the laying form,

determining the angular geometry of the rear edge upon passing across the fixed detection line,

aligning the rear edge,

10 finishing winding up the intermediate area around the laying form, and
depositing the rear area on the laying form.

7. Method according to claim 5, wherein the advancements of the conveyer and transporters are respectively synchronized with the rotation of the laying form.

15 8. Method according to claim 6, wherein the advancements of the conveyer and transporters are respectively synchronized with the rotation of the laying form.

20 9. Method according to Claim 4, in which the length of the ply is adjusted by moving the two transporters longitudinally and in respective opposite directions by the required correction values.

10. Method according to claim 5, wherein the length of the ply is adjusted by modifying, in a given ratio, the synchronisation of the advance of the conveyer and transporters with respect to the rotation of the laying form.

5 11. Method according to claim 6, wherein the length of the ply is adjusted by modifying, in a given ratio, the synchronisation of the advance of the conveyer and transporters with respect to the rotation of the laying form.

12. Method according to claim 5, wherein the laying form has a curved crown having a large diameter and a small diameter, further comprising the following steps:

10 unwinding and cutting the belt strip in order to obtain a ply of predetermined length (L1) close to a smallest circumference ($\pi \times D1$), putting the ply under tension by stretching to a length (L2) such that the ratio $k = L2/L1$ is between 1 and $D2/D1$, and

15 effecting the alignment of the ply edges by adding to the correction values determined by the analysis of the angular geometries measured for each of the front and rear edges a predetermined value for compensating for the angular variations introduced by the curve and the tensioning of the ply.

20 13. Method according to claim 6 wherein the laying form has a curved crown having a large diameter (D2) and a small diameter (D1), comprising the following steps:

25 unwinding and cutting the belt strip in order to obtain a ply of predetermined length (L1) close to the smallest circumference ($\pi \times D1$), putting the ply under tension by stretching to a length (L2) such that the ratio $k = L2/L1$ is between 1 and $D2/D1$, and

5 effecting the alignment of the ply edges by adding to the correction values determined by the analysis of the angular geometries measured for each of the front and rear edges a predetermined value for compensating for the angular variations introduced by the curve and the tensioning of the ply.

10 14. Method according to claim 5, wherein the front and rear areas are divided into only three gripping sectors forming respectively the toe, the central gripping sector and the heel, and in which only the gripping assembly gripping the toe is equipped with an edge corrector for adjusting the edge of the ply by moving the toe of the ply independently while keeping fixed the gripping assemblies gripping the central gripping sector and the heel.

15 15. Method according to claim 6, wherein the front and rear areas are divided into only three gripping sectors forming respectively the toe, the central gripping sector and the heel, and in which only the gripping assembly gripping the toe is equipped with an edge corrector for adjusting the edge of the ply by moving the toe of the ply independently while keeping fixed the gripping assemblies gripping the central gripping sector and the heel.

20 16. Method according to claim 5, wherein the belt ply is deposited in advance of an intermediate magnetic belt, and in advance of a magnetic belt on the laying form.

17. Method according to claim 6, wherein the belt ply is deposited in advance of an intermediate magnetic belt, and in advance of a magnetic belt on the laying form.

18. Transporter arranged to move along a longitudinal axis of a conveyer, wherein the transporter comprises:

5 at least three gripping assemblies driven in a rising and falling movement on an axis perpendicular to the plane of the ply posed on the conveyer, placed on a pivoting cross-member, and disposed so that the gripping assemblies can grip and release each of the gripping sectors dividing respectively the front area or rear area of a belt ply, and

10 at least one gripping assembly equipped with a ply edge corrector for moving in a plane parallel to the plane of the ply placed on the conveyer, independently and by a correction value whose magnitude is controllable, of this same gripping assembly.

15 19. Transporter according to Claim 18, wherein the ply edge corrector is arranged to make a rectilinear movement in a direction lying between a direction substantially perpendicular to the longitudinal axis and a direction substantially perpendicular to the ply edge.

20. Transporter according to Claim 18, wherein the ply edge corrector is arranged to make a circular movement about an axis substantially perpendicular to the plane of the ply placed on the conveyer.

20 21. Transporter according to Claim 18, wherein the pivoting cross-member is arranged to effect a rotation of 180° about an axis perpendicular to the plane of the conveyer and pass through the point of attachment of the cross-member.

22. Transporter according to Claim 18, wherein the gripping assembly comprises one or more pneumatic suckers.

23. Transporter according to Claim 18, wherein the gripping assembly comprises one or more electromagnets.